



Peppermint Stick Insect (Megacrania batesii)

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PLANNING AND ORGANIZATION MEETINGS

A quarterly meeting is scheduled in order to plan club activities and the magazine.
See BOIC Programme.

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AIMS OF THE ORGANIZATION

- To establish a network of people growing butterfly host plants;
- To hold information meetings about invertebrates;
- To organize excursions around the theme of invertebrates e.g. butterflies, native bees, ants, dragonflies, beetles, freshwater habitats, and others;
- To promote the conservation of the invertebrate habitat;
- To promote the keeping of invertebrates as alternative pets;
- To promote research into invertebrates;
- To encourage the construction of invertebrate friendly habitats in urban areas.

MAGAZINE DEADLINES

If you wish to submit an item for publication the following deadlines apply:

March issue – February 1 st	June issue – May 1 st
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September issue – August 1st December issue – November 1st

All articles should be submitted directly to the Editor daphne.bowden1@bigpond.com

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COVER PHOTO

Peppermint Stick Insect (*Megacrania batesii*) – Photo by Todd Burrows



FROM THE PRESIDENT

In recent times, we have again seen and experienced the typical Australian cycle of prolonged drought followed by bush fires and now (hopefully) continued good rains. As has happened in the past, our resilient plants will sprout new growth, seeds that needed heat then water to germinate will push up from the soil, vertebrates and invertebrates will recolonise devastated areas over time and the cycle will continue. Our challenge is to adapt to this cycle.

Thanks again to those who have taken time to report on their experiences, observations and knowledge gained so that we can learn from them. I hesitate in naming individuals as each person's contribution is of value and **greatly appreciated**.

You will notice that we have several activities planned for the next few months and I urge you to participate if "in range". It is always good to meet others in person at our events.

On occasion, emails from Daphne "bounce" as members have changed their email addresses so - a special plea - please advise her if your contact details have changed. If you wish to be added to the Membership Directory, please let Daphne know.

Ever the optimist, I look for positive outcomes, but I find it quite disappointing that no one has taken up our offer of free butterfly host plant seeds as listed in the December edition of our magazine. Did you miss the item?

Best wishes *Ross*

IN THIS ISSUE

Peppermint Stick Insect (<i>Megacrania batesii</i>)	4
Leps in Books: the Strange Case of the Popular Clothes-moths.....	7
Native bees and honey dew	11
Life sucks for two Hemipteras.....	12
Life history notes on the Tailed Emperor, <i>Charaxes sempronius</i> (Fabricius, 1793) ...	13
<i>Hylebatis scintillifera</i> Turner, 1908 (Lepidoptera: Crambidae: Acentropinae).....	18
The genus <i>Charaxes</i> (Lepidoptera: Nymphalidae) continued from Issue #95.....	19
Book Review - Hawkmoths of Australia; Identification, Biology and Distribution....	34
Beetles of Brisbane <i>A fold-out book of photos</i>	37
Report - Australian Entomological Society Conference and associated bus trip to the Bribie Island Butterfly House	38
Seed Bank.....	39
BOIC Programme	39



Peppermint Stick Insect (*Megacrania batesii*) – Bernie Franzmann

I attended two presentations at the recent Australian Entomological Society Conference in Brisbane in December, where the peppermint stick insect (*Megacrania batesii*) was featured.

These prompted my memory of when I discovered this insect in Australia in 1971. I distinctly remember a few things that day. It was a beautiful sunny day at Etty Bay, just a few kilometers south of Innisfail, in North Queensland. I think Etty Bay is one of the most beautiful, idyllic beaches in Australia. It is bounded at each end by a rocky headland where the forest comes down to the water. To add to the scene, usually one or two cassowaries can be seen walking up and down the beach.

So I was completely content that day, little realizing that I was about to stumble across this fascinating, beautiful creature. While my wife was playing with our six-month-old daughter on the beach, I went in search of the banana scab moth (*Nacoleia octasema*). I was studying this insect which is a pest of bananas in north Queensland. The larvae feed on the skin of the young banana fruit, just as the inflorescence emerges from the throat of the plant, leaving unsightly “scabs” when the fruit matures. Another host of the moth is the screw palm (screw pine) (*Pandanus* sp.), where the larvae feed on the flowers. I was investigating the palms which were growing on these headlands, when I saw the stick insect and noticed a faint peppermint smell. I collected the specimen, which was a female, and went in search of more. I gave up searching after I disturbed a snake, wrapped around one of the leaf whorls.

The insect was a striking blue/green colour and I thought it looked interesting, as blue colours in the integument are very unusual in insects.

The specimen was identified by Dr Ken Key, CSIRO, as *M. batesii* and he advised me that it was a new sub-family record from Australia (Franzmann, 1974). It is in the Family Phasmatidae, Subfamily Platycraninae. The species was originally described from the Solomon Isles in 1896 (Brock & Hasenpusch, 2009), and is the sole representative of the subfamily in Australia (Cermak & Hasenpusch, 2000).

After I was told that it was a new record for Australia, I went about studying it somewhat.

In 1973, I made some intensive searches from Cairns in the north and south to Mission Beach, and I found another small patch, about 50m long, along the waterfront at Mission Beach. In all my findings I found only females, *and now I know why*.

Cermak & Hasenpusch, (2000) carried out a study/survey between Cape Tribulation and Mission Beach in 1998/99.



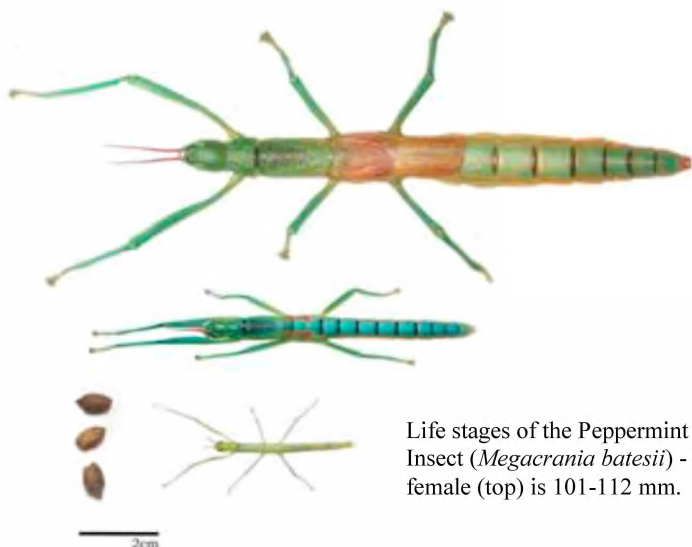
They found five isolated, separate, shore-line populations.

Their studies of these populations revealed that the Cape Tribulation population contains both males and females, while the southern populations, south of Cairns, appear to reproduce by parthenogenesis, as they never found any males in these populations.

I kept a colony of females in my laboratory, for three months in 1973, and although many eggs were laid none of them hatched, *and I now know why*. The egg incubation period is about four months (Brock & Hasenpusch, 2009), so I never gave them enough time to hatch.

The insect inhabits the leaf axils. When adults are disturbed sufficiently they eject a white-coloured fluid from glands situated on the prothorax just behind the head. The fluid has a smell similar to peppermint; hence the name. Although the fluid is non-irritant to exposed skin, it irritates the eyes on contact.

The following observations of the biology are taken from Cermak & Hasenpusch, (2000).



Life stages of the Peppermint Stick Insect (*Megacrania batesii*) - Adult female (top) is 101-112 mm.

Adults and nymphs rest within the deep groove on the upper surface of *Pandanus* leaves, or on the underside. They adopt a distinctive posture with front and mid legs stretched forward and hind legs directed backwards. Most of the life stages are well camouflaged on the green foliage. However, the last nymphal instar is quite conspicuous with most individuals being bright blue-green. The eggs are dropped



haphazardly to the ground or on to the leaves of the host plant. They often roll down into the spiral centre of the *Pandanus* plant, where they are eventually covered and secured by frass from feeding adults. Though both sexes are winged, *M. batesii* do not fly. Males are capable of parachuting to the ground when disturbed, but females do not attempt to fly at all.

Cermak & Hasenpusch, (2000) analysed the conservation status. They concluded that the Cape Tribulation population is under no threat but that the other four populations may be of some concern as they are distributed over very small areas. However, they concluded that the Etty Bay population appears to be relatively secure as it occurs within the Johnson Shire's Conservation Area and is also situated within the Wet Tropics World Heritage Area.

I searched the World Wide Web for more information. It is designated as the insect icon of the Daintree Rainforest and a Phantastic Phantom Phasmid. Various pages mention that tour operators point them out to their customers, and disturb them, in order to see the peppermint spray. The Wet Tropics Management Authority caution that "this is a strenuous act for the frightened stick insect, so if you are lucky enough to find one in your travels through the wet tropics, please don't try to touch it."

I am told that the insect is favored as a pet by stick-insect aficionados but although the demand is high the problem of a need for a supply of fresh *Pandanus* to keep them fed, limits their use.

So almost fifty years have passed since that day at Etty Bay and the peppermint stick insect continues to fascinate and excite.



Peppermint Stick Insect
nymph on *Pandanus*

All Photos Jessa Thurman

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Leps in Books: the Strange Case of the Popular Clothes-moths – *Roger Kitching*

At a rough count I have over 300 books on butterflies and moths in my personal library. Most of these are guides to the ‘Butterflies of ..here’ and the ‘Moths ofthere’. Only a few are more intense accounts of particular families. In general the families involved are the larger more ‘popular’ groups such as Geometridae, Sphingidae and Arctiinae (which we used to call the Arctiidae before the Zahiri *et al* (2011) revolution). If you want to indulge in continent-envy, then have a look at the six volumes of ‘*The Geometrid Moths of Europe*’ (Hausmann 2003-2019) – superb, comprehensive authoritative volumes which may never be surpassed, even in Europe – but more of them some other time.

If the microlepidoptera are your special interest (as they are becoming mine) then the choice is even more limited, although the larger ‘micros’ in the Pyraloidea (the Crambidae and Pyralidae) are now receiving the attention they deserve in Europe and China at least.

And then there are the Tineidae.

The tineids are small moths with forewing length ranging from about 2.0 to 16.0 mm, although the overall distribution of sizes skews heavily towards the smaller end of this range. There are about 2500 described species of tineids in the world with about as many again in museums awaiting description and perhaps 1500 more still out there uncollected and unknown (Robinson 2009). In Australia the estimates are 187 named species in 44 genera with a similar number of known but unnamed species (Neilsen & Robinson 1993). Again an unestimated number no doubt await first discovery here. The tineids in general are almost unique among the moths in their larval feeding habits. A few are traditional plant feeders but the majority have switched their larval habits to dead and decaying plant and animal matter and/or the fungi associated with this decay. Within this broadly defined resource many unique specialisations have arisen: feeding on the fungi embedded in lichens, mantid eggcases, bird and bat guano, within termite and ant nests (some snacking on the ant larvae) and, not least, preserved skins, tortoiseshell and woollen carpets (Robinson 2009).

My attention was drawn to this family when I received the superb book by Reinhard Gaedike for review (Gaedicke 2019). This is Volume 2 on Tineidae in the incomparable series *Microlepidoptera of Europe* comprising, so far, of nine authoritative volumes. Gaedicke published Volume 1 of this treatment in 2015. I’ll return to these fine publications later. This did lead me to my bookshelves where, to my mild surprise, I discovered an additional three volumes on this family alone (and there are more out there). Nor are these slim volumes with, for example, the



published translation of Zagulajev's (1988) fifth volume alone on the Tineidae of the USSR running to 533 pages. This got me to asking why had this group of rather dull-looking and small moths received so much attention.

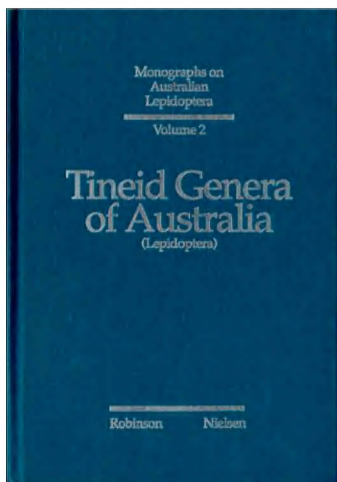
The perhaps too obvious answer, already alluded to, is that they inflict major damage on the human enterprise. A few species are direct pests of crops notably sugarcane and some species of mushrooms. Others feed on stored products such as grains, seeds, nuts and dried fruit particularly in damp conditions. Another has been known to attack the corks of wine bottles (now that is serious). It is, however, the distinctive larval ability of most tineids of feeding on keratin (hair, wool and so on) that has led to their most significant transgressors. The three genera of clothes moth (*Trichophaga*, *Tineola* & *Tinea*) were estimated in 1993, to cause annual damage of over US\$1 billion through their depredations on wool, fur, feathers and, even, some leathers (Robinson & Neilsen 1993).

These pest species, important as they are, represent perhaps less than 1% of all the Tineidae. Their biology has been well studied by many entomologists so why has the eclectic range of volumes on the whole family emerged? The answer can probably be summarized by one name: Gaden Robinson.

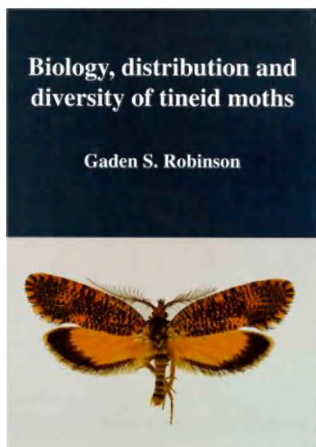
Gaden Robinson (1949-2009) was a curator and researcher at the Natural History Museum, London, from 1974 until his retirement in April 2009. He died in September of that year. Robinson's entomological work focussed principally on the Tineidae – their taxonomy, evolution and biology – but he also published on the ghost moths, the Hepialidae. Although he took a global approach to the Tineidae, his focus was on the smaller moths of south-east Asia, the Pacific and its islands (including Australia). He led the publication of the very useful *Field Guide to the Smaller Moths of South-East Asia* (Robinson, Tuck & Schaffer 1994) inspired in large part by his participation in the centenary expedition of the Royal Entomological Society of London's year-long expedition to Sulawesi in 1985: in which I also had the privilege to take part. He was also an expert philatelist and writer of popular works for children and adults.

A further two of his major works are of particular concern here.

The first (Robinson & Neilsen 1993) is a conspectus of the genera of Australian Tineidae, coauthored with a Danish/Australian lepidopterist who also died at an unconscionably early age, Ebbe Schmidt Neilsen (1950-2001). This work reviews all of the many subfamilies of Tineidae that occur in Australia and has an extensive introduction on the evolution,



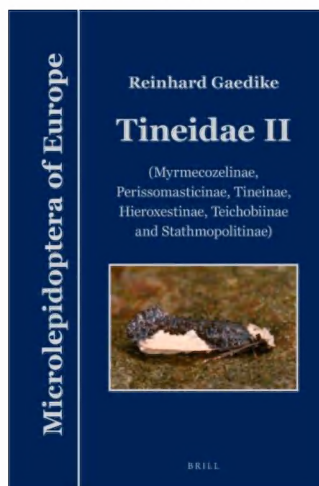
morphology, biology, biogeography and economic importance of the family in a global context. It also establishes firmly the identity of the 44 genera of the family recorded from Australia. Although lavishly illustrated with many whole moth *habitus* pictures, the book contains no colour images.



This highly technical book is complemented by Robinson's final and, in my view, most significant work, *Biology, Distribution and Diversity of Tineid Moths*. This book was published posthumously in 2009, the year of Robinson's death. It is a racy, idiosyncratic, gripping account of the whole family of moths globally with many personal anecdotes, scraps of fascinating natural history and a set of helpful colour plates. It is noteworthy that this work was sponsored and co-published by Dato' Henry Barlow, an English businessman based in Kuala Lumpur as well as a keen entomologist, whose support has led to the fine 18 volume series *Moths of Borneo*, as well as Robinson's books, as well as several books on the butterflies of the Region. This semi-popular work was

Robinson's swansong but leaves the rest of us with an understanding and enthusiasm for the family that goes far beyond antipathy for their clothes-destroying capacities.

Finally, then, what of Gaedike's book which sparked the whole trail of thought leading to this article. The second volume, which I have before me, deals with six subfamilies of tineids represented by the 103 species which occur in Europe and the immediately adjacent regions. Each species is illustrated in colour. In addition there are meticulous line drawings of the male and female genitalia of each species: essential for their definitive identification. The colour plates, superbly prepared by Igor Kostjuk, are photographs of pristine, 'perfect' adults (I searched for but could not even find a missing antenna) and allow identification to genus at least by visual comparison alone.



It would be misleading to say that this is a book which should be on the desk of every Australian moth enthusiast. It is expensive and would be an indulgence indeed. If, however, you want a model as to how such a guide should be presented, or merely want to fantasize how nice it would be if we had such a guide to any comparable part



of the Australian moth fauna, then it is worth seeking out a copy simply to admire what is, to a lepidopterist at least, a work of art.



I am grateful to Rosanna Woenstregt, Assistant Editor, Brill Publishers, for permission to reproduce the cover image and Plate 2 of Gaedike's fine book.

Photos Roger Kitching



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Native bees and honey dew – Peter Macqueen

In the dry of early December, I noticed native bees *Tetragonula carbonaria* being attracted to aphid infested rocket, *Eruca sativa*, in our vegetable garden at Kleinton, north of Toowoomba. The plants were young and not flowering and aphids had rapidly infested them and covered them with honeydew that the bees appeared to be collecting. Due to conditions, there were very few flowering plants for the bees.

Various aphid predators were observed, common spotted ladybeetles *Harmonia conformis*, red and blue beetles *Dicranolaius bellulus* and considerable parasitisation of the aphids by *Aphytis* wasps. These predators controlled the aphids within 10 days from when the bees were seen taking the honeydew.

With some searching, references were found to honey bees feeding on honeydew as a sugar source before flowers open in cooler climates or when there is a lack of flowering plants. In Britain, bumble bee species are recorded as using honeydew as an interim food source, or preferring it due to higher sugar content. In regions of Southern Europe, various honeys are produced from the honeydew of plant hoppers and other *Hemiptera* on various conifers and oaks. New Zealand produces beech honey produced from honeydew on *Notofagus fusca*.

While many insecticides for sucking insects have a caution against using them when the plants are flowering, this observation highlights the hazard to bees of using these products when the plants are not flowering as bees may be foraging on the honeydew of sucking insects.

Has anyone else noticed native bees of any species taking honeydew?



Biography

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Life sucks for two Hemipteras – Ron May

The Predator – Assassin Bug (*Pristhesancus plagipennis*) [Walker]

[Hemiptera:Reduviidae]

The Pest – Bronze Orange Bug (*Musgraveia sulciventris*) [Stål]

[Hemiptera: Tessaratomidae]

In the spring and early summer of 2019, at Mt. Lofty in Toowoomba, two species of Hemipteras were observed in Citrus. The Bronze Orange Bug was sucking on the new stalks, causing damage to young growth, flowers and fruit, whilst the Assassin Bug waited to ambush *M. sulciventris* and with its sharp rostrum pierce its body and insert a toxic fluid, before sucking the contents of its body (Fig. 1).

These photos show a nymph of *M. sulciventris*, possibly third instar, being predated upon by *P. plagipennis*. After the Assassin Bug had completed consuming the body fluids of its victim, the body fell to the ground (Fig. 2).



Fig. 1



Fig. 2

Photos M. Tucker



Life history notes on the Tailed Emperor, *Charaxes sempronius* (Fabricius, 1793) Lepidoptera: Nymphalidae - Wesley Jenkinson

This magnificent, well-known butterfly was previously listed as *Polyura sempronius sempronius* in Braby 2000. Its currently assigned taxonomic status is *Charaxes*



sempronius, as published in the more recent Braby 2016. Its historical nomenclature was discussed by Peter Hendry in the first part of his article on *Charaxes* in the previous edition (No. 95) of this magazine.

This species is known sporadically from all states except for Tasmania. Within Queensland it is chiefly located in coastal and subcoastal areas, along the Great Dividing Range, and in places reaches further west. The mapped range in Braby 2000 has been considerably increased in Braby 2016 for adjacent areas in eastern South Australia, NSW and Victoria as well as the Northern Territory and the

Kimberley region of Western Australia. This is probably a result of more frequent reporting of observations, rather than the butterfly expanding its range.

Adults utilise a wide range of habitats including rainforest, coastal woodland, wet sclerophyll forest, dry vine thicket, eucalypt open forest and open woodland. They also establish in parks and suburban gardens wherever their host plants are available.

Adults fly high and rapidly around tree tops. Males fiercely defend territories typically perching on leaves, facing outwards with head angled downwards. They also strongly hilltop, chasing rival males. Females also have a rapid flight but may fly much lower when searching for ovipositing sites on host trees. When perched, adult hindwings are sometimes slowly moved forward and backwards in a similar way to some lycaenids with hindwing tails (Braby 2000). This motion is exhibited to deter would-be predators away from the main body parts. Flight occurs in both sunny and warm cloudy conditions.

The adults are listed as uncommon but widespread in Braby 2000 and Braby 2016. At any particular site (including hilltops) they rarely appear in numbers of more than 2 or 3. This is rather surprising considering the large number of hosts their larvae feed on. Larvae and pupae bred in the wild often result in being parasitised or eaten by birds. Perhaps this may be part of the reason for the low numbers. I can recall once counting



7 adults sap feeding on an exotic Golden Rain (*Cassia fistula*) tree in Beaudesert, South-east Queensland during the mid-seventies.

Unlike most butterflies the adults feed on fermenting fruit juices and tree sap rather than flowers. After feeding for long periods the adults become intoxicated allowing for an easy approach (Braby 2000). One afternoon, during summer, I sighted four adults sap feeding on *C. fistula* at 2.00 pm. Two were still present later in the evening until at least 6.30 pm. In addition, I have also observed adults feeding on both fresh and decomposing cow manure.

Within this species individual specimens show variation in physical size and minor variation in the size of the cream subterminal spots on upperside (Braby 2000). The sexes are rather difficult to separate, males are generally smaller in size with the forewing termen being more concave.

Wingspans for the pictured adult specimens are males 75mm and females 82mm respectively.



***Charaxes sempronius* (Tailed Emperor)**

Images top left to right: male, female Images lower left to right: male underside, female underside





This species utilises a very large number of host plants, mainly legumes in the families Mimosaceae and Caesalpiniaceae. References to various works are given in Braby 2000, listing 46 species in 11 families. These include both native and exotic hosts. An additional nine confirmed hosts (and five more needing confirmation) have since been published for South-east Queensland (Moss, 2019). Sankowsky (1991) listed the small NQ dry country tree *Adenanthera abrosperma* (Mimosaceae) for this species. Recently (January 2020) a larva went through to final instar before being devoured by a bird on a young cultivated *A. pavonina* tree in John Moss's garden [images pictured above], where *Pararchidendron pruinosum* (Mimosaceae) and *Brachychiton australis* (Sterculiaceae) are the usual preferred hosts. Peter Hendry was the first to report the Black Booyong (*Argyrodendron actinophyllum*, Sterculiaceae) as a host for this butterfly (Hendry, 2003). Australia-wide, more hosts may already be known or will possibly be discovered in the future.

At Beaudesert during September 2005, a female was observed laying several eggs on a cultivated *Acacia irrorata* in my garden. She flew strongly around the tree and then settled on a leaf with wings closed. The abdomen was curled onto the upperside on the leaf and a single egg was laid. This was pattern was repeated six times before she flew away. More mature leaves were favoured rather than fresh shoots. This observation was made at 10.30 am during slightly overcast conditions. Several eggs were successfully raised to adults.

The pale yellowish green eggs were approximately 2.0 mm wide x 1.6 mm high, spherical shaped with a flattened apex and fine vertical ribs. A dark maroon band surrounding the apex area appeared after 2 days.



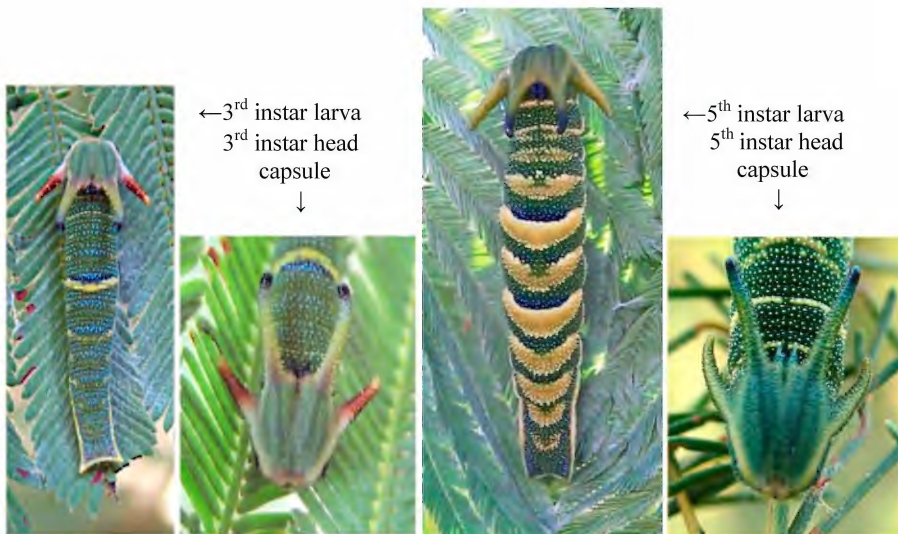
Note: Eggs are may be bright green when freshly laid.

At a time of 11.45 am, one of the eggs was discovered with a small hole starting to appear in the top of the eggshell. The larva mandible was facing upwards as it ate at the top of the eggshell. It was fully hatched by 12.15pm, half an hour later. Larvae generally consume the entire eggshell at hatching.



1st instar larva

2nd instar larva



←3rd instar larva
3rd instar head
capsule
↓

←5th instar larva
5th instar head
capsule
↓

After hatching the larva rested and later began to create a small silk pad to rest on. Over a period of time the larva was observed feeding at dusk, during the night, or sometimes during daylight in cloudy conditions. It fed on leaves near its silken pad, completed five instars, and reached a length of 50mm. On host plants with smaller leaves, several leaves are silked together to form the resting pad. On larger leafed host plants such as *C. fistula* the silk pad is spun on a single leaf.

Note: As larvae frequently die when raised in containers, they should be raised in netting bags on the host plant.





The previous images (page 16) show the larva feeding on a 'fern leafed' type wattle. When feeding on this type of leaf, larger larvae exhibit numerous yellow transverse bands. As the larvae rest openly, this is thought to provide extra camouflage. While feeding on broader leaved plants they usually show two yellow bands [adjacent image]. First and second instars have no bands; these begin to develop in the 3rd instar as can be seen in the previous images. On rare occasions bands fail to develop. John Moss (pers. comm.) has seen this with late instar larvae feeding on *Brachychiton australis* (Broad-leaved Bottle Tree) in his garden.

The green and white coloured pupa, measuring 27mm in length, was located below a small stem of the host plant. It was attached with silk, hanging by the cremaster, with the head suspended downwards. Pupae may be found several metres away from the host on different plants if vegetation is entwined.



Pre-pupa



Pupa

The total time from an egg laid 03/09/2005 to an adult emerging 10/12/2005 was just over 3.5 months, with egg duration 8 days, larval duration 74 days and pupal duration 16 days.

On another occasion, two adults were observed emerging from their pupal shells at Beaudesert during a mid-October period. They were ready to fly by 7.45am.

Within the new boundary of the Scenic Rim Regional Shire south of Brisbane, I have adult records during all months of the year. In this location they are more numerous during January and February, April and May and being much less common from June to September. Although it is not clear, there are at least two or possibly three generations per year in this region.

I would like to thank John Moss for suggestions to the manuscript and supplying images of the actual *A. pavonina* tree and associated larva.

Photos Wesley Jenkinson and John Moss



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***Hylebatis scintillifera* Turner, 1908 (Lepidoptera: Crambidae: Acentropinae) – Peter Hendry**

I found this small moth which I determined to be *Hylebatis scintillifera* Turner, 1908 on the side of my shade house. Based on the shade cloth itself its body length is about 6mm, Turner gave the wing span as ♂ ♀, 12-16mm. A member of the Crambidae family, subfamily Acentropinae, Turner raised the genus at the time he named *H. scintillifera*. He distinguished *Hylebatis* from *Nymphula* by the difference in the palps. *Nymphula* is no longer recognized in the Australian Faunal Directory with most of the species named in it being transferred to *Parapoinx*.



The genus *Hylebatis* is monotypic (containing one species). Turner, 1908 noted *H. scintillifera* occurred in “*Queensland at Eumundi, near Nambour and Mount Tambourine, in November (agrees with my record), December, and March (and is) common in damp places in the tropical forest growth*. The last statement is far removed from the situation here at Sheldon, Redland City, where I found my specimen. We had one of the hottest springs on record and the worst bushfire seasons Queensland has seen, due to the dry conditions. My property could be described as open Eucalyptus forest.

Photo Peter Hendry

Reference

- Turner, A.J. 1908. New Australian Lepidoptera of the families Noctuidae and Pyralidae. *Transactions of the Royal Society of South Australia* 32: 55-109 [84]



The genus *Charaxes* (Lepidoptera: Nymphalidae) a look at the Australian species from an historical perspective and an overall view of the world taxa – continued from Metamorphosis Australia Issue No. 95 – Peter Hendry



Fig. 32



Fig. 33



Fig. 34

The other species in the Eudamippus group are, *C. posidonius* Leech, 1891, *C. dolon* Westwood, 1847, *C. weismanni* Fritze, 1894 and *C. weismanni* Fritze, 1894.

Pyrrhus group is the largest in the subgenus *Polyura* containing 15 species. The Australian species, *sempronius* and *andrewsi* have been dealt with above.

Charaxes pyrrhus pyrrhus (Linnaeus, 1758) was illustrated (Fig. 35) in volume



Fig. 35

four of Seba's "Thesaurus"⁷, 1765. The type location was given by Linnaeus as India. Smiles, 1982 gives the distribution as the Indonesian islands of Buru, Ambon, Seram, Saparua and Batjan (The Bacan Islands). There are ten other subspecies involved;



C.p. jovis Staudinger, 1895 from Sambawa, Indonesia; *C. p. galaxia* Butler, 1866 from Wetar, Indonesia and Timor; *C. p. kalaonicus* (Rothschild, 1898) from Flores, Indonesia and Kalao, Philippines; *C. p. aloranus* (Rothschild, 1898) from Alor, Indonesia; *C. p. lettianus* (Rothschild, 1898) from the Indonesian Islands of Kisar, Romang, Leti, and Moa Island (Banks Island) in the Torres Straight; *C. p. babbericus* (Fruhstorfer, 1903) from Babar Island, Indonesia; *C. p. antigonus* (Fruhstorfer, 1904) from the Indonesian Islands of Sermata and Damar; *C. p. romanus* (Fruhstorfer, 1904) from Romang, Indonesia; *C. p. bandamus* (Rothschild, 1898) from Banda Island, Indonesia and *C. p. scipio* (Rothschild, 1898) from Sumba, Indonesia.

The other species in the *Pyrrhus* group are, *C. cognatus* (Vollenhoven, 1861), *C. dehanii* (Westwood, 1850), *C. epigenes* Godman & Salvin, 1888, *C. sacco* (Smart, 1977), *C. caphontis* Hewitson, 1863, *C. attila* Grose-Smith, 1889, *C. gamma* Lathy, 1898, *C. clitarchus* Hewitson, 1874, *C. gilolensis* Butler, 1869, *C. smilesii* (Toussaint, 2015), *C. jupiter* Butler, 1869 and *C. inopinatus* Röber, 1939.

The subgenus *Eriboea* contains 82 species in 7 species groups.

Eupale group contains 7 species.



Fig. 36

Charaxes eupale eupale (Drury, 1782) was illustrated (Fig. 36) along with the original description. The type location is Sierra Leone, it also occurs in Senegal, Guinea-Bissau, Guinea, Liberia, Ivory Coast, Ghana, Togo and Nigeria. The larvae feed on *Albizia* species, *Cathormion* species (Fabaceae) and *Scutia myrtina* (Rhamnaceae). There are two other subspecies involved, *C. e. latimargo*

Joicey & Talbot, 1921 (Figs 37 & 38) from Nigeria, Cameroon, Gabon, Congo,



Fig. 37



Fig. 38



Central African Republic, Angola, Democratic Republic of Congo, Sudan, Uganda, Rwanda, Kenya and Tanzania, and *C.e. veneris* White & Grant, 1989 from Tanzania, Malawi and Zambia.



Fig. 39



Fig. 40

Charaxes minor Joicey & Talbot 1921 [(Figs 39 & 40) in the Guyomar collection as *Charaxes subornatus minor* it was raised to species status by Bouyer, 1999 in Notes sur les Charaxes du « groupe eupale » avec description d'une nouvelle sous-espèce (Lepidoptera Nymphalidae); *Entomologia Africana* 4(1)]. The type location is the Mabira Forest, Uganda, it also occurs in the Democratic Republic of Congo and Kenya. The larvae probably feed on species of *Albizia* (Fabaceae). Bouyer, 1999 also described a new subspecies, *C. m. karinae* from Angola, however this subspecies does not appear in Wahlberg's checklist.

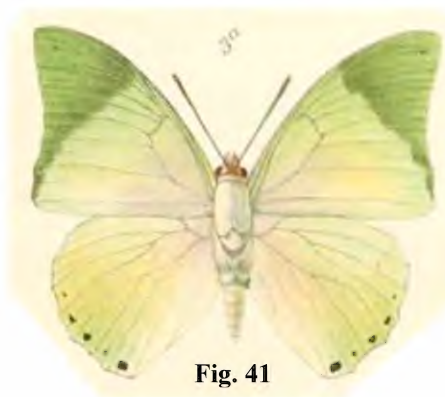


Fig. 41

The other species in the Eupale group are, *C. schultzei* Röber, 1936, *C. subornatus* Schultze, 1916 illustrated (Fig. 41) along with the original description, *C. dilutus* Rothschild, 1898, *C. montis* Jackson, 1956 and *C. schultzei* Bouyer, 1991.

Solon group contains 4 species.

Charaxes solon solon (Fabricius, 1793) was described from an illustration in "Jones's Icons", it was also illustrated (Fig. 42) under the synonym *Charaxes fabius* Fabricius, 1781 by Moore, [1880],

in *The Lepidoptera of Ceylon* Vol. 1. The type location was not given by Fabricius but his synonym *C. fabius* was noted as being from India. The larvae are known to feed on plants in the family Fabaceae. There are five other subspecies involved, *C. s. cerynthus* Fruhstorfer, 1914 from Sri Lanka; *C. s. sulphureus* Rothschild & Jordan, 1898 from Assam to Myanmar, Thailand, Laos, Cambodia and Vietnam; *C. s.*



raidhaka Rhé-Philipe, 1908 from India; *C. s. cunctator* Fruhstorfer, 1914 from Annam, Vietnam and *C. s. jordani* Fruhstorfer, 1914 from South Celebes (Sulawesi, Indonesia).

Charaxes echo echo Butler, 1867 [(Fig. 43) in the Moss collection as *Charaxes solon echo*, a position it held until recently. Toussaint, Tuylin and Balke, 2019 revised back to species status three subspecies of *solon*, being, *echo*, *hannibal* and *lampedo*]. The type location was given as Singapore, it also occurs in Borneo and West Malaysia. The larvae most likely feed on plants in the



Fig. 43

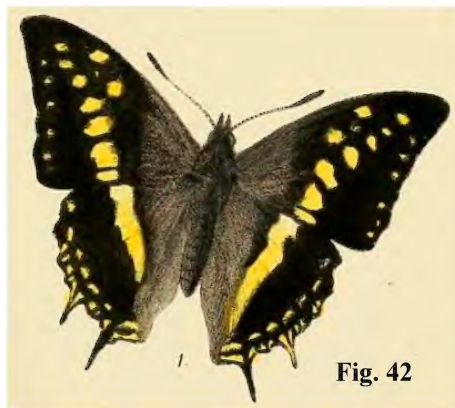


Fig. 42

Fabaceae family. There are four other subspecies involved; *C. e. sumatranus* Rothschild, 1898 from Sumatra; *C. e. breviculus* Tsukada, 1991 from the Natuna Islands between Malaysia and Borneo; *C. e. obscurus* Hanafusa, 1989 from Karimata, Indonesia and *C. e. setsuroi* Tsukada, 1991 from Singkep, Indonesia.

The other species in the Solon group are, *Charaxes lampedo* (Hübner, 1823) and *Charaxes hannibal* Butler, 1869.

Jahlusa group contains 1 species.



Fig. 44

Charaxes jahlusa jahlusa (Trimen, 1862) was illustrated (Fig. 44) along with the original description. The type location was given as interior South Africa. The larvae feed on African *Acacia* species (now in the genus *Vachellia* and *Senegalia*), *Dalbergia melanoxylon* (Fabaceae); *Grewia* species (Tiliaceae) and *Haplocoelum foliolosum*, *Lecaniodiscus fraxinifolius*, *Pappea capensis* (Sapindaceae). There are eight other subspecies involved, *C. j. argynnides* Westwood, 1864 from



Angola, Democratic Republic of Congo, Tanzania, Malawi, Zambia, Mozambique, Zimbabwe, Botswana, South Africa and Swaziland; *C. j. ganaleensis* Carpenter, 1937 from Sudan, Ethiopia, Uganda and Kenya; *C. j. kenyensis* Joicey & Talbot, 1925 from Somalia?, Kenya and Tanzania; *C. j. pallene* van Someren, 1974 from Kenya; *C. j. kigomaensis* van Someren, 1975 from Tanzania; *C. j. mafiae* Turlin & Lequeux, 1992 from Tanzania; *C. j. rex* Henning, 1978 from Zimbabwe, Botswana and South Africa and *C. j. rwandensis* Plantrou, 1976 from Rwanda and Tanzania.

Hildebrandti group contains 1 species.

Charaxes hildebrandti hildebrandti (Dewitz, 1879) (Fig. 45) was illustrated (Fig. 46)



Fig. 45



Fig. 46

along with the original description. The type species is from Angola, it is also found in Nigeria, Cameroon, Gabon, Congo, Central African Republic, Democratic Republic of Congo and Uganda. The larvae feed on *Dyboscia* species (Tiliaceae). There are two other subspecies involved; *C. h. gillesi* Plantrou, 1973 from Ghana, Ivory Coast, Nigeria and Sierra Leone and *C. h. katangensis* Talbot, 1928 from the Democratic Republic of the Congo, Uganda and Zambia.

Etesipe group contains 6 species.

Charaxes etesipe etesipe (Godart, 1824) (Figs 47 & 48); while I believe the figured specimen to fit within this subspecies, it is more commonly found with more blue within the tails and the marginal band between the tails. A sexually dimorphic species, a female from Sierra Leone was illustrated by Drury, 1782 (Fig. 49) in Illustrations of Natural History Vol. III, Plate 10, under the name *Papilio Nymphalis Phualeratus etheocles*, believing it to be Cramer's 1777, *etheocles*. Rothschild, 1900 in Novitates Zoologicae Vol. VII, stated it was "non Cramer, 1777" and referred the illustration to *Charaxes etesipe*. The type species is from Sierra Leone, it also occurs in Angola, Benin, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Nigeria, Rwanda, Senegal, South Sudan, Sudan, Tanzania, Togo and Uganda. The larvae have been recorded feeding on numerous plants in the following plant families; Bombaceae,



Erythroxylaceae, Euphorbiaceae, Fabaceae, Rhamnaceae and Polygalaceae. There are another seven subspecies involved; *C. e. abyssinicus* Rothschild, 1900 from Ethiopia; *C. e. gordonii* van Someren, 1936 from Kenya; *C. e. hercules* Turlin & Lequeux, 2002 from Uganda; *C. e. patrizii* Storace, 1949 from Somalia; *C. e. pemba*



Fig. 47 ♂



Fig. 48



Fig. 49

van Someren, 1966 from Tanzania; *C. e. shaba* Berger, 1981 from Zaire and *C. e. tavetensis* Rothschild, 1894 from Kenya, Tanzania, Malawi, Mozambique, Zimbabwe, South Africa and Swaziland. Some authors believe that the subspecies *tavetensis*, *gordonii* and *pemba* may constitute a species distinct from *Charaxes etesipe*.

Charaxes achaemenes achaemenes
Felder & Felder, 1867 the male was illustrated (Fig. 50) along with the original description. The type location was given as "South Africa; Port Natal, Zambesi", now Durban, it also occurs in Angola, Democratic Republic of Congo, Kenya, Tanzania, Malawi, Zambia, Mozambique, Zimbabwe, Botswana, Namibia, and Swaziland. The larvae feed on *Bauhinia* species, *Brachystegia*

spiciformis, *Dalbergia* species, *Piliostigma thonningii*, *Pterocarpus* species, *Xanthocercis zambesiaca* (Fabaceae) and *Diospyros mespiliformis* (Ebenaceae). There are two other subspecies involved; *C. a. monticola* van Someren, 1970 (Fig. 51) from Nigeria, Cameroon, Central African Republic, Democratic Republic of



Congo, Sudan, Ethiopia, Uganda and Kenya, and *C. a. atlantica* van Someren, 1970 from Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Ivory Coast, Ghana, Togo and Benin.



Fig. 50♂



Fig. 51♀

The other species in the Etesipe group are, *Charaxes penricei* Rothschild, 1900, *Charaxes cacuthis* Hewitson, 1863, *Charaxes paradoxa* Lathy, 1926 and *Charaxes bwete* Basquin, 2012.

Anticlea group contains 6 species.

Charaxes anticlea anticlea (Drury, 1782), was illustrated (Fig. 52) along with the original description. The type species is from Sierra Leone, it also occurs in Senegal, Guinea, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Gabon, Congo, Central

African Republic, Angola, Democratic Republic of Congo, Uganda, Kenya, Tanzania and Zambia. Larvae are known to feed on species of *Mezoneuron*, *Pterolobium*, and *Senegalia* (Fabaceae). There four other subspecies involved; *C. a. adusta* Rothschild, 1900 from the Democratic Republic of Congo, Tanzania and Uganda; *C. a. mwera* Vingerhoedt & Bouyer, 1996 from the Democratic Republic of Congo; *C. a. proadusta* van Someren, 1971 (Figs 53 & 54), [in the Guyomar collection simply as *C. anticlea* but best fits this subspecies], from Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabo, Nigeria and Zambia and *C. a. suna* van Someren, 1975 from Kenya.



The other species in the Anticlea group are, *Charaxes baumanni* Rogenhöfer, 1891, *Charaxes opinatus* Heron, 1909, *Charaxes thysi* Capronnier, 1889, *Charaxes taverniersi* Berger, 1975 and *Charaxes blanda* Rothschild, 1897.



Fig. 52



Fig. 53♂



Fig. 54♂v

Etheocles group is by far the largest in the subgenus *Eriboea* containing 57 species. A complex group of black males with few morphological features to separate them, while the females of many species take on several forms and mimic other females.

Charaxes etheocles etheocles (Cramer, 1777), (Figs 55♂ & 56♀); a female was illustrated (Fig. 57 ♀) along with the original description. Figure 58 is in the Guyomar collection as *Charaxes etheocles* form *alladinis*. It is interesting to note that Butler, 1869 in *Cistula Entomologica* Vol. 1 described it as a male, *Charaxes alladinis*. Rothschild and Jordan, 1900 pointed out that it was a female, noting several other authors who had described females as males, and referred to it as a female form of *Charaxes etheocles etheocles*. This was followed by Henning, 1989 in the *Charaxinae Butterflies of Africa*. The type location is the coast of Guinea, near Sierra Leone.



It is also known from Ghana, Ivory Coast, Liberia, Nigeria, Senegal, Sierra Leone and Togo. The larvae feed on *Scutia myrtina* (Rhamnaceae), *Celtis* species (Cannabaceae), *Griffonia simplicifolia*, *Albizia gummifera*, and species of



Fig. 55♂



Fig. 56♀



Fig. 57♀



Fig. 58♀

Bandeiraea, *Cathormion*, *Dalbergia* and *Entada* (Fabaceae). There are three other subspecies involved; *C. e. carpenteri* van Someren & Jackson, 1957 from Democratic Republic of Congo, Ethiopia, Kenya, Sudan, Tanzania, Uganda and Zambia; *C. e. evansi* van Someren & Jackson, 1957 from Kenya and *C. e. silvestris* Turlin, 2011, the type species of which is from Kellé, north-eastern Democratic Republic of Congo.

Charaxes catachrous van Someren & Jackson, 1952 (Fig. 59♂) in the Guyomar collection as *C. catochrous* which appears to be a spelling mistake (cata-cato) it is in fact deeper than that. Staudinger, 1896 in *Deutsche Entomologische Zeitschrift*, *Iris* Vol. 9 described *catochrous* as an aberration of *Charaxes ephyra*. Someren & Jackson, 1952 in the *Transactions of the Royal Entomological Society of London* Vol. 103 raised it to species status as *Charaxes catachrous*. The type location is given as



Cameroon it also occurs in Nigeria, Gabon, Congo, Central African Republic, Democratic Republic of Congo, Uganda, Tanzania and Zambia. The larvae have been recorded on *Scutia myrtina* (Rhamnaceae).



Fig. 59♂

Charaxes cedreatis Hewitson, 1874 (Figs 60♂ & 61♀) the type location was given as "West Africa", it occurs in Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Central African Republic, Angola, Democratic Republic of Congo, Sudan, Uganda, Kenya, Tanzania and Zambia. The larvae feed on *Albizia brownii*, *A. grandibracteata*, *A. zygia*, *Dalbergia lactea*, *Griffonia simplicifolia* (Fabaceae); *Annona*

senegalensis (Annonaceae) and *Scutia myrtina* (Rhamnaceae).



Fig. 60♂



Fig. 61♀

Charaxes ethalion ethalion (Boisduval, 1847) the female (Fig. 62) was illustrated along with the original description. It is a sexually dimorphic species with four female forms. The male (Figs 63 & 64) is from the Pickering collection. The type location was given as "Port Natal" now Durban, South Africa, it also occurs in Mozambique, Zimbabwe and Swaziland. The larvae feed on species of *Albizia*, *Amblygonocarpus andongensis*, *Brachystegia microphylla*,



Fig. 62♀



Cathormion altissimum, *Dalbergia lactea*, *Tamarindus indica*, *Vachellia kirkii* as well as other species in the family (Fabaceae); *Maytenus* species (Celastraceae) and *Scutia* species (Rhamnaceae). There are eight other subspecies involved; *C. e. binghami* Henning, 1982 from Zambia and Zimbabwe; *C. e. fisheri* Henning, 1982 from Zambia; *C. e. handmani* Henning, 1982 from Malawi and Mozambique; *C. e. kikuyuensis* van Someren, 1967 from Democratic Republic of Congo, Tanzania and Malawi; *C. e. littoralis* van Someren, 1967 from Kenya and Tanzania; *C. e. marsabitensis* van Someren, 1967 from Kenya; *C. e. nyanzae* van Someren, 1967 from Democratic Republic of Congo, Uganda, Kenya and Tanzania.



Fig. 63♂



Fig. 64♂v



Fig. 65♂



Fig. 66♀

Charaxes guderiana guderiana (Dewitz, 1879) (Fig. 65♂) a sexually dimorphic species, the female was illustrated (Fig. 66♀) by Rothschild and Jordan, 1900. The type species is from Angola, it also occurs in Democratic Republic of Congo, Rwanda, Tanzania, Malawi, Zambia, Mozambique, Zimbabwe, Botswana, Namibia and South Africa. The larvae feed on *Amblygonocarpus andongensis*, *Brachystegia* species, *Dalbergia lactea*, *Dalbergia melanoxylon* and *Julbernardia globiflora* (Fabaceae). There is one other subspecies involved *C. g. rabaiensis* Poulton, 1929 from Kenya.



Charaxes kheili kheili Staudinger, 1896; [(Fig. 67♂) in the Guyomar collection as *Charaxes kirki*, I believe it is a better fit for this species] the type species is from the Central African Republic, it is also found in Cameroon, Gabon and the Democratic Republic of Congo. I found nothing on the larval food plants. There are two other subspecies involved; *C. k. northcotti* Rothschild, 1899 from Guinea, Burkina Faso, Ivory Coast, Ghana and Nigeria, and *C. k. madi* Turlin & Lequeux, 2010 from Uganda.



Fig. 67♂

Charaxes virilis virilis van Someren & Jackson, 1952; (Fig. 68♂) *virilis* was first brought about by Rothschild and Jordan, 1900 as a female form of *Charaxes etheocles*. The type locality was given as West Africa, it occurs in Guinea, Sierra Leone, Burkina Faso, Ivory Coast, Ghana, Benin, Nigeria, Cameroon, Gabon, Congo, Central African Republic and the Democratic Republic of Congo. The larvae feed on *Adenanthera pavonina*, *Cathormium* species, *Dalbergia* species, *Entada* species, *Griffonia simplicifolia* and *Tetrapleura* species (Fabaceae). There is one other subspecies involved *C. v. lenis* Henning 1989; *lenis* was first brought about by Jordan, 1929 as the male form of



Fig. 68♂

Charaxes etheocles in the Transactions of the Entomological Society of London Vol 77; it is from Uganda.

The other species in the *Etheocles* group are, too numerous to name here and can be found in Wahlberg's checklist at (http://www.nymphalidae.net/Nymphalidae/Classification/Cha_Charaxini.htm) under the subgenus *Eriboea* from SPEC *Charaxes virilis* van Someren & Jackson, 1952 to SPEC *Charaxes nyungwensis* Vingerhoedt & Vande weghe, 2011.

The subgenus Euxanthe contains 11 species in 2 species groups.

Euxanthe group an Afrotropical group contains 6 species.

Charaxes eurinome eurinome (Cramer, 1775) was illustrated (Fig. 69) along with the original description. It occurs in Sierra Leone, Ivory Coast and from Ghana to Nigeria; it is also found on the Island of Fernando Pó. The larvae feed on *Afzelia*





Fig. 69

africana (Fabaceae); *Deinbollia pinnata*, *Blighia* and *Phialodiscus* species (Sapindaceae). There are three other subspecies involved; *C. e. ansellica* (Butler, 1870) from Angola, Cameroon, Central African Republic, Zaire and Uganda; *C. e. birbirica* (Ungemach, 1932) from Ethiopia and *C. e. lequeuxi* (Turlin, 2009) from Congo.

The other species in the Euxanthe group are, *Charaxes crossleyi* (Ward, 1871), *Charaxes wakefieldi* (Ward, 1873), *Charaxes madagascariensis* (Lucas, 1843), *Charaxes trajanus* (Ward, 1871) and *Charaxes tiberius* (Grose-Smith, 1889).

Lycurgus group contains 5 species.



Fig. 70



Fig. 71



Fig. 72

Charaxes lycurgus (Fabricius, 1793) (Fig. 70) [figure 71 is in the Guyomar collection as *Charaxes lycurgus*, I found no other examples of this form and no other species that it could be referred to]. The larvae was illustrated (Fig. 72) by Schultze, 1916 under the synonym of *Charaxes laodice* Drury, 1782. The type locality was simply given as “in Africa”; it occurs in Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Central African Republic, Angola, Democratic Republic of Congo, Sudan, Uganda and Tanzania. The larvae feed on *Albizia zygia*, *Dalbergia*



species, *Lonchocarpus cyanescens*, *Millettia* species, *Philenoptera cyanescens*, *Pterocarpus santalinoides* (Fabaceae); *Dichapetalum* species (Dichapetalaceae); *Paullinia pinnata* (Sapindaceae) and *Trachypphrynium* species (Marantaceae). Though the subspecies *C. l. bernardiana* Plantrou, 1978 is referred to by many authors it was synonymized with *C. lycurgus* by d'Abrera in 2004.

Charaxes mycerina mycerina (Godart, 1824) (Fig. 73) the type location was not given in the original description, it is known from Ghana, Ivory Coast, Liberia, Nigeria and Sierra Leone. I found nothing on the larval food plants. There is one other subspecies involved; *C. m. nausicaa* Staudinger, 1891 from Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, and Nigeria.



Fig. 73



Fig. 74

Charaxes porthos porthos Grose-Smith, 1883 (Fig. 74) the type species is from Camaroon, it also occurs in the Central African Republic, Congo, Democratic Republic of Congo, Gabon and Nigeria. The larva for this species seems to be unknown. There are three other subspecies involved; *C. p. dummeri* Joicey & Talbot, 1922 from Tanzania and Uganda; *C. p. gallayi* van Someren, 1968 from Ghana, Guinea, Ivory Coast, Nigeria and Sierra Leone and *C. p. katangae* Rousseau-Decelle, 1931 from the Democratic Republic of Congo.

Charaxes zelica zelica Butler, 1869 (Fig. 75) the type location was given by Butler as "West Africa (Ashanti ?)", it is also known from Ghana, Guinea, Ivory Coast, Nigeria and Sierra Leone. The larval food-plants, though shown on the funet website and published in Afrotropical Butterflies 17th edition 2018, to be unknown are doubtfully listed on



Fig. 75



Wikipedia as *Pterocarpus santalinoides*, *Albizia zygia*, *Lonchocarpus cyanescens*, *Dalbergia* species, *Millettia* species (Fabaceae); *Paullinia pinnata* (Sapindaceae); *Dichapetalum* species (Dichapetalaceae) and *Trachyphrynium braunianum* (Marantaceae). There are three other subspecies involved; *C. z. depuncta* Joicey & Talbot, 1921 from Kenya, South Sudan, Sudan and Uganda; *C. z. rougeoti* Plantrou, 1978 from Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabon and Nigeria and *C. z. toyoshimai* Carcasson, 1964 from Tanzania.

The other species in the *Lycurgus* group is *Charaxes doubledayi* Aurivillius, 1899.

The subgenus *Charaxes* is the largest of the subgenera, it contains 119 species in 14 species groups.

Zingha group contains 1 species.

Charaxes zingha (Stoll, 1782); (Figs 76 & 77) the type specimen was noted as being



Fig. 76

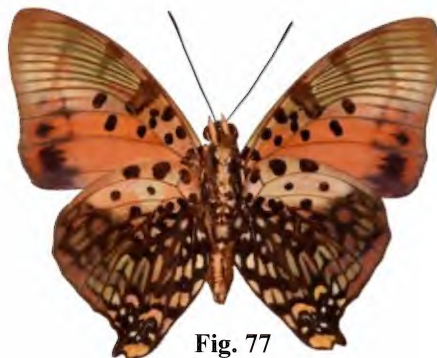


Fig. 77

from the coast of Africa and has been recorded from, Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Ghana, Guinea, Ivory Coast, Liberia, Nigeria, Senegal, Sierra Leone, Tanzania and Uganda. The larvae feed on *Hugonia* species (Linaceae).

This article will be continued in issue No. 97

Photos Peter Hendry

ERROR



In Issue No. 95 of *Metamorphosis Australia*, Life history notes on the Large Yellow Grass-dart, *Taractrocera anisomorpha* (Lower, 1911) Lepidoptera: Hesperidae by Wesley Jenkinson, the two images of *T.anisomorpha* and *T.ina*. were transposed.

This is how they should have appeared. My apologies
Wes. Ed.

Left to right *T.anisomorpha* female, *T.ina* female



Hawkmoths of Australia; Identification, Biology and Distribution; *Monographs on Australian Lepidoptera Volume 13* – Peter Hendry



“Currently, Moulds has in preparation a monographic account of the Australian sphingid fauna”; these words rang out from the pages of the 1996 4th volume of the *Monographs on Australian Lepidoptera*, Checklist of the Lepidoptera of Australia. It would be another 24 years before all the preparation stopped and the Monograph became reality.

Authored by Maxwell S. Moulds, James P. Tuttle and David A. Lane what immediately stands out is the size; moving from near B5 size of all previous volumes to the larger A4 format. The imaged cover is also a departure from the normal dark blue with silver embossed text (see Roger Kitching’s article in this issue for an image of

Vol. 2). Only volume 7 had a photographic image on the cover while volume 9, still in the standard blue with silver text, had a dust jacket with photographic images. While the size means it will live out of place on the library shelf, I instantly became a fan when viewing the size and clarity of the line drawings contained within.

Not including the Preface and Acknowledgements, this is a four hundred and fourteen page volume packed with a detailed account of the Australian Sphingidae. Reading through the acknowledgements reveals the vast team of amateurs and professionals alike that is required to take on such a task as this. Also revealed is the time taken by the number who have sadly passed before its completion. It seems many years ago that I had the pleasure of meeting Tom Sleep, on more than one occasion, who would come out from England to meet up with his son David, to travel the country looking for Hawkmoths; just two of the many acknowledged for their help in this volume. Following the acknowledgements is a list of all the previous volumes in this series.

This is followed by a chapter on organisation and presentation which includes a list of taxonomic changes proposed in this volume, including the fact that a new genus is described. This is followed by a chapter on an historical review, followed by one on structure and function, wherein those aforementioned line drawings start to appear. The line drawings cover all you could wish for - adult, head, palps, thorax, abdomen, wings and frenulum, all clearly depicted along with the terminology of the various parts. This is also done for the genitalia, larva and pupa.

The next three chapters are on collecting and preservation, rearing hawkmoths and biology. The depth and detail of this volume is now very evident with paragraphs on



the egg, larval growth and moulting, behaviour, colour morphs and camouflage, food plants, pupa and many more including pathogens, predators, mites and parasitoids.

We next come to a chapter on classification and nomenclature which includes a list of species deleted from the Australian fauna and a list of those not previously recorded from Australia. Page 36 is the start of the checklist of Australian species; increased from the 63 species listed in the 1996 Checklist to 87 species with a total of 89 taxon (including all subspecies). All are listed to sub-specific level where they apply. This is followed by a key to the last larval instar for 71 species, with diagrams showing terminology used. Next is a key to the pupae of 70 species, accompanied by diagrams of various species. Both keys are backed up by colour plates towards the back of the book.

It is then on page 45 that the start of a detailed account of each taxon begins, starting first with an account of the genus then the specific species and or subspecies within the genus. For each genus the type species is given along with any synonyms, the number of species worldwide and a list of the Australian taxon, followed by a general discussion on distribution, description, eggs, larvae and pupae. For each species/subspecies references to any figures or plates of the adult and immature stages are given, followed by any synonyms, the type, distribution and habitat, adult diagnosis, descriptions of immature stages (including egg, each larval instar where known, and pupa). The biology is then discussed, giving details of egg laying, larva and pupa habits, parasitoids and predators, and adult flight times. Also included is a distribution map using the dot method, where a dot represents the exact location of a known specimen, as opposed to a range map where the known locations are filled in covering gaps that may or may not contain the particular taxon. Looking at the map of the distribution of *Agrius convolvuli*, which is common throughout Australia, reminds me of the map displayed by Max Moulds, showing the locations where he has collected, when he gave a talk at the Entomological Society of Queensland, though I think Max's map had more dots, almost no part of Australia untouched. There is also a key to the adults of the genus *Psilogramma* (page 212) backed up by annotated images (page 214). Difficult to separate species are imaged and or figured showing the points of difference. *Hippotion rosetta* once believed not to occur on the Australian mainland is shown to have a distribution across the top of Australia and down the east coast of Queensland; its mix up with *H. boerhaviae* is dealt with. Also dealt with is the removal of various taxon like *Macroglossum hirundo* and *Cephonodes hylas* from the Australian checklist, to name just two of the six removed.

All but three taxon are detailed from page 45 to 274. The "missing three" are dealt with in the following addendum, as they are new to Australia and discovered after the manuscript was complete.

After the addendum is the start of the plates, by far the largest number found in any of the previous monographs in this series.



PLATES 1-3 are black and white images of parasitoids, covering 14 Hymenoptera (wasps) and 8 Diptera (flies).

PLATES 4-72 are colour plates covering the life histories of 70 taxon. 42 with complete life cycles egg to live adult, 43 counting *Acosmeryx cinnamomea* with an image of an unrecognizable adult attacked by a fungus. 47 with adults, 48 counting *Acosmeryx cinnamomea*. 70 taxon with pupa all but *Cerberonoton severina* with 3 views, lateral, dorsal and ventral; *Cerberonoton severina* has 6 lateral views of the pupa showing colour changes from 1 minute to 18 hours after formation. 66 with eggs. 66 with all instars, most with 2 or more colour morphs of various instars especially the last. *Coenotes eremophilae* with 6 last instars and *Macroglossum micacea micacea* with 4 last instar show images of almost impossibly different variations. 6 plates show larva with parasites, 2 show larva under fungus attack, 3 show larva being preyed upon, 1 shows a larva being fed upon and 5 plates contain images of food plants.

PLATES 73- 82 are coloured plates of set adults containing 132 specimens covering 86 of the 89 taxon. The “missing three” are imaged, in black and white, within the text in the addendum. Many taxon are represented by multi images some representing male and female others showing variations. There is one of a gynandromorphy. Plate 82 contains Christmas Island specimens with one from Cocos Keeling Island.

PLATE 83 contains coloured images of habitats.

PLATES 84-92 are black and white plates of genitalia covering 86 of the 89 taxon, with the “missing three” included with the text in the addendum.

The plates are followed by a one page glossary; Appendix 1, covering Sphingidae-Parasitoid associations; Appendix 2, a summary of known larval food-plants, references, and the volume is rounded out with the index.

Almost as if to show us they are human I found the misspelling of *convolvuli* as *convolvuli* and *prometheus* as *promethus* on the face of plate 82. Listed on page 3 under taxonomic changes and again on page 181 at the start of the dealings with *Macroglossum melas melas*, is the fact that *M. melas pullius* is now considered a synonym of *M. melas melas*. However the taxon is referred to as *M. melas pullius* on page 182 when comparing it to *M. micacea micacea* and again on page 183 when *M. micacea micacea* is compared to *M. melas pullius*. On page 183 under the descriptions of immature stages of *Macroglossum micacea micacea*, the egg is described as such “*Pale yellow when first laid, becoming pale yellow with maturity...*”. If one was to search for fault, I find some of the images in the plates of set specimens to be a shade dark. All in all faultless and will be prized by all who purchase a copy. Its usefulness is greatly enhanced by the inclusion of detailed descriptions and keys of the larva and pupa, backed up with colour plates thereof.



The appeal of this book should cover a wider audience than most of the Monographs as the Hawkmoths are popular amongst many a non-moth enthusiast, though the cost may stop some.

I am sure there will be many superlatives written about this book. It is simply magnificent, setting a new standard for monographs worldwide. I am confident this will remain the standard for Australian Hawkmoths for decades to come and the words Moulds, Tuttle and Lane, 2020 will follow many a quotation on Australian Hawkmoths.

This hardcover book is available from CSIRO Publishing at a cost of AU \$220.



BEETLES OF BRISBANE *A fold-out book of photos*

Congratulations to Colleen Foelz, an enthusiastic member of both the Butterfly & Other Invertebrates Club (BOIC) and the Entomological Society of Queensland

(ESQ). With support and advice from ESQ, Colleen has published an excellent illustrated pocket guide introducing us to over 100 beetles. Of course, these insects are found over a far greater range than just the Brisbane area.

Richard Zietek, our experienced beetle expert makes the following comments. "It will

Comments received by BOIC from the Community:

- **A local book by a local author**
- **Fills a void for beetle enthusiasts**
- **A great book to have in your back pocket when on bush walks**
- **Loved by bush regenerators**
- **An interesting attractive teaching tool for my pre-school class**
- **A perfect gift for my grandchildren**
- **The price is perfect**

promote interest in this very interesting and diverse group of insects". "It has been produced with the amateur in mind". "It will fill many gaps for identification of these amazing creatures". "I am certain this publication will fill a number of voids in the average naturalist's knowledge".

The guide is available for purchase through the BOIC. Visit

our webpage

<http://boic.org.au/index.html?page=/html/booksale.html>



Australian Entomological Society Conference and associated bus trip to the Bribie Island Butterfly House – *Murray Fletcher*, Director of Communications, Australian Entomological Society (AES)

Early in December, the Australian Entomological Society (AES) came to Brisbane for their annual Scientific Conference. The Butterfly and Other Invertebrates Club offered delegates a preconference bus tour on Sunday 1st to the Bribie Island Butterfly House followed by lunch at the Sandstone Point Hotel. Nearly 30 AES and BOIC members took advantage of the offer and had a great day out.

The Butterfly House was everything you would want with butterflies of several species (but mainly Common Eggyfly) floating about in profusion and landing on your hand if you held it out. A brief history was given on the bus by Ray Archer who first established a Butterfly House at Buaraba with his wife Delphine in 2009 before moving to Bribie Island in 2016 where they were instrumental in founding the not-for-profit Bribie Island Butterfly House. See <https://www.bribieislandbutterflyhouse.org/history> for the full story. Ray proved to be a wonderful character, full of enthusiasm and energy.

Lunch was made a little difficult by strong winds but we all coped.

The AES members thank BOIC for making this excursion possible and, in particular, Dawn Franzmann who first contacted the conference organisers about making this excursion part of the social program of the conference.

Members of BOIC also manned a stand in the Brisbane Convention Centre throughout the conference to promote the club, not only to AES delegates but also delegates from the Society of Australian Systematic Biologists and the Australasian Arachnological Society who were co-hosts of the meeting.



SEED BANK

There are small quantities of each of the following host plant seeds available. If you require any of them, please send a stamped, self-addressed envelope to Daphne Bowden, 24 Rickston Street, Manly West Qld. 4179 and list which seeds you want. Please keep in mind that for the Seed Bank to operate we need deposits as well as withdrawals.

<i>Alternanthera denticulata</i>	<i>Glycosmis trifoliata</i>
<i>Aristolochia acuminata</i> (Tagala)	<i>Melicope elleryana</i>
<i>Aristolochia macroura</i>	<i>Melodorum leichhardtii</i>
<i>Asclepias curassavica</i>	<i>Pararistolochia praevenosa</i>
<i>Asystasia gangetica</i>	<i>Senna acclinis</i>
<i>Brachychiton populneus</i>	<i>Senna gaudichaudii</i>
<i>Hygrophila angustifolia</i>	<i>Sesbania cannabina</i>

BUTTERFLY AND OTHER INVERTEBRATES CLUB PROGRAMME

World Science Festival

What? "City of Science" is the new branding for the formerly known "Street Science Activity" of the World Science Festival. The BOIC will be holding a display to inform visitors about invertebrates and the club. Our display booth will be shared with members of the Entomological of Queensland on Saturday and with members of the Australian Native Bee Association on Sunday.

When? Saturday, 28th and Sunday 29th March from 9am

Where? The location of the Festival this year will be on the Forecourt between the State Library, Queensland Museum and GOMA at South Bank. There is no entry fee.

Annual General Meeting

What? The club's AGM will feature the President's Annual Report and the election of committee office-bearers. Following our meeting, Mark Schutze who is from the Department of Agriculture and Fisheries and is the Manager of the Queensland Government Insect Collection will give a talk on "The History of Entomology in Queensland and the Qld. Govt. Insect Collection".

When? Saturday, 18th April 2020 from 10.00am

Where? The Hut Environmental & Community Association (THECA), 47 Fleming Road, CHAPEL HILL

RSVP? If attending, please respond to Dawn Franzmann, Secretary BOIC on 0419 786 369 or secretaryboic@gmail.com

Planning and General Meeting

What? Our quarterly planning meetings are informative and interesting, and we welcome members to contribute to the discussions. Jessa Thurman is a Ph.D. student at the University of Queensland and a member of BOIC. Recently she was part of a research expedition in New Guinea. Her talk will be on her trip and her experiences with the "Peppermint Stick Insect" complemented by her wonderful photography.

When? Saturday, 16th May from 10am

Where? Downfall Creek Bushland Centre, Rode Road, Chermside West

RSVP? If attending, please respond to Dawn Franzmann, Secretary BOIC on 0419 786 369 or secretaryboic@gmail.com



DISCLAIMER

The magazine seeks to be as scientifically accurate as possible but the views, opinions, and observations expressed are those of the authors. The magazine is a platform for people, both amateur and professional, to express their views and observations about invertebrates. These are not necessarily those of the BOIC. The manuscripts are submitted for comment to entomologists or people working in the area of the topic being discussed. If inaccuracies have inadvertently occurred and are brought to our attention we will seek to correct them in future editions. The Editor reserves the right to refuse to print any matter which is unsuitable, inappropriate or objectionable and to make nomenclature changes as appropriate.

ACKNOWLEDGEMENTS

Producing this magazine is done with the efforts of:

- Those members who have sent in letters and articles
- Todd Burrows who provided the cover photo
- Daphne Bowden who works on layout, production, and distribution
- Paul Brock, Peter Hendry, John Moss, Tim Heard, Bernie Franzmann and Ross Kendall for scientific referencing and proof-reading of various articles in this issue of the magazine

ARE YOU A MEMBER?

Please check your mailing label for the date your membership is due for renewal. If your membership is due, please renew as soon as possible. **Annual membership fees are \$30.00 for individuals, schools, and organizations.** If you wish to pay electronically, the following information will assist you: BSB: **484-799**, Account No: **001227191**, Account name: **BOIC**, Bank: **Suncorp**, Reference: your membership number and surname.

Butterfly and Other Invertebrates Club Inc.
PO Box 2113
RUNCORN Q. 4113

Next Club event – World Science Festival – Saturday 28th and Sunday 29th March

